

# PATENT SPECIFICATION

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## DRAWINGS ATTACHED

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## (54) INSERTS FOR ANCHORAGE IN SANDWICH PANELS

5 (71) We, SHUR-LOK CORPORATION, a corporation organised and existing under the laws of the state of California, United States of America, of 1300 East Normandy Place, Santa Ana, California 92711, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to inserts for anchorage in sandwich panels and to a method of anchoring such inserts in sandwich panels.

15 Heretofore it has been the usual practice to anchor a fastener insert in a panel hole by means of potting compound injected into the hole, surrounding the insert, and cured to a rigid anchoring body.

20 Another type of insert, which does not require potting, is anchored by mechanical means, usually embodying the formation of a head or heads at one or both ends of the insert, which grip one or both skins of a sandwich panel, usually with a riveting action. A yet further type is a welded insert.

25 According to the invention there is provided an insert for anchorage in a sandwich panel having a pair of spaced skins secured to respective sides of a low density core, said panel having a hole extending through one of the skins and through said core and having a bottom closed by the other skin, the insert comprising a tubular spacer body having a fastener receiving bore, a head at one end of said body, receivable in the outer end of said hole and having a first flange for abutting engagement with said one skin, the other end of said body having a second flange providing a blind bottom for said bore, the first or second flange having a pad of heat-softenable bonding material respectively engageable with said one or other skin, said pad being adapted to yield when softened by heat conducted to it through the corresponding flange, thereby to attach the  
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insert to the panel by bonding action of said pad.

According to another aspect of the invention there is provided a method of anchoring a fastener insert in a hole in a sandwich panel extending through one skin thereof and ending at the other panel skin, said insert having an internally threaded bore, a head at one end of the body and having a first flange, the other end of said body having a second flange providing a blind bottom for said bore, the method comprising providing the first or second flange with a pad of heat-softenable material, inserting said insert into said hole with the first and second flanges abutting said one and other skin respectively and with said pad in contact with said one or other skin, inserting a heated tool into said bore and heat-softening said pad by conduction of heat through the corresponding flange so as to bond the insert to the panel.

This invention provides a fastener insert which requires no potting or riveting but, instead, may be attached to the respective skins of a panel by bonding. Pads of heat-softenable plastics material may be secured respectively to the flange head and to the blind end of the insert. One pad is preferably attached to the under or rear side of the flange head, and is advantageously in the form of a washer encircling the body of the insert. The other pad is then preferably in the form of a disc attached to the end face of the blind end of the insert. One of the pads may be thicker than the other and adapted to be thinned by extrusion when heat-softened, whenever necessary to in order to adjust the spacing between the adhering faces of the pads to the spacing between the panel skins so that both pads may be simultaneously bonded to their respective skins. Thus the insert may be fitted to panels having a range of thicknesses. Bonding heat may be applied by means of a heated tool in an installation including the insertion of its tip, similar

to a soldering iron or the like, into the fastener bore and pressing it against the bottom of the bore. This also serves to apply pressure to the insert to hold it in place while the adhesion pads are being softened, and to properly locate it with respect to the panel.

An insert and a modification thereof, each in accordance with the invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is an end view of the insert showing the blind end before attachment of an anchor pad,

Fig. 2 is a side view of the insert, partially in section,

Fig. 3 is a side view of the complete insert, partially in section,

Fig. 4 is an end view showing the head of the insert,

Fig. 5 is a sectional view illustrating installation of the insert, and

Fig. 6 is a side view showing the modification.

Referring to Figs. 3 and 5, the insert A is adapted to be mounted in a hole in a sandwich panel B and secured to the respective skins thereof by heat-bonding in which heat is conducted from a heated tool C through the metal body of the insert to heat-softenable plastic surfaces of the insert.

The insert A consists of a metal body 10 insertible into a hole 11 drilled into the panel B and a pair of bonding pads 12 and 13 of heat-softenable plastic material such as a thermoplastic material known in the trade as "hot melt" adhesives, adapted to adhere to the skins 14 and 15 of the panel B when softened by heat conducted through the body 10 from heated tool C.

The body 10 comprises a tubular, internally threaded spacer stem 20 adapted to function as a nut to receive a threaded fastener element; an outer head 21 receivable in the hole 11 and having a thin radial flange 22 which overlaps the panel skin 14 when the insert is in place in hole 11; and an inner end which may be in the form of a head 23, to which the pad 13 is attached. The head 23 (Fig. 1) has radial knurling 24 to which the pad 13 (Fig. 3) is anchored, e.g. by heat-bonding.

The pad 12 is in the form of a thin washer having an area corresponding to the annular area of the back face of the flange 22, and secured thereto as by heat-bonding. It may now be noted that the insert, prior to installation, consists of the body 10 and pads 12 and 13 securely attached to the back faces of the flange 22 and the blind head 23 so that the insert may be handled without the pads becoming detached, and are ready for instant anchorage to a panel by simply inserting into a panel hole and then applying heat from the tool C.

The heads 21 and 23 are of slightly smaller diameter than the hole 11 so as to be freely

receivable therein and to locate the insert with reference to the panel. The pad 13 is preferably in the form of a disc of the same diameter as the head 23. One of the pads is of sufficient thickness to engage its skin while the other pad is slightly spaced from its skin, prior to heat softening of the pads. For example, in Figs. 1-5 the pad 13 is thicker than the pad 12, and is adapted to engage its skin first. Alternatively, as shown in Fig. 6, the pad 12A is thicker than the pad 13A, and is normally the first to effect contact with its respective skin.

Thus, in those installations wherein the panel thickness is less than the maximum of a range of thicknesses to which a particular insert is adaptable, one pad will be the first to seat against its respective skin when the insert is placed in the hole 11, and as the two pads are softened by the application of heat, the other pad will be reduced in thickness by radial extrusion as indicated in Fig. 5, thus allowing such other pad to move into contact with and to adhere to its respective skin. Thus the insert will automatically adjust itself to any panel skin spacing within a range of panel thicknesses for which the insert is designed.

The tool C comprises a body 30 containing a suitable heating element (not shown, since it can be of any well-known type, as in soldering irons) and having at its forward end a tip 31 slidably mounted in a bore 32 therein and loaded by a coil spring 33 so as to establish full spring-loaded contact with the bottom of the threaded bore of the insert, and then to recede so as to allow the forward end of body 30 to establish full heat-transmitting contact with head 21 and flange 22. Thus heat may be conducted directly to both ends of the insert simultaneously, for maximum speed and evenness of softening of both adhesive pads.

The advantages of the invention are that it provides a fastener insert:

- 1) of relatively simple and inexpensive construction;
- 2) which can be installed and securely attached to panel skins without deforming them;
- 3) which can be securely anchored without potting;
- 4) which can be simultaneously attached to both skins;
- 5) which is self-adjusting to a range of panel thicknesses.

#### WHAT WE CLAIM IS:—

1. An insert for anchorage in a sandwich panel having a pair of spaced skins secured to respective sides of a low density core, said panel having a hole extending through one of the skins and through said core and having a bottom closed by the other skin, the insert comprising a tubular spacer body having a fastener receiving bore, a head at one end of said body, receivable in the outer end of said hole and having a first flange for abutting engagement with said one skin, the other end of said

- body having a second flange providing a blind bottom for said bore, the first or second flange having a pad of heat-softenable bonding material respectively engageable with said one or other skin. said pad being adapted to yield when softened by heat conducted to it through the corresponding flange, thereby to attach the insert to the panel by bonding action of said pad.
2. An insert according to claim 1, wherein both of said flanges have pads of heat-softenable bonding material so that both flanges are capable of being bonded to the panel.
3. An insert according to claim 2, wherein said first flange extends radially from the periphery of the head so that said first flange is of annular shape, the pad on the first flange also being of annular shape.
4. An insert according to claim 2 or 3, wherein one of said pads is thicker than the other pad, for engagement with its respective skin prior to engagement of the other skin by the other pad, the thicker pad yielding under compression when softened so as to allow the other pad to advance into contact with its respective skin, thus providing for adjustment to a range of panel thicknesses.
5. An insert according to claim 4, wherein the pad on said first flange is thinner than the pad on said second flange.
6. An insert according to any of claims 2 to 5, wherein the pad on said second flange is of flat disc-like shape.
7. An insert according to claim 1, wherein said pad is a thin washer of hot-melt material attached to the back face of said first flange and adapted to seat against said one skin and to become a bonding layer between said first flange and said one skin when subjected to heat applied to said one end of said body and transmitted by conduction through said first flange, whereby to secure said insert to said panel.
8. An insert according to any of claims 2 to 6, wherein the other end of said body is knurled, the corresponding pad being secured and anchored to the knurling.
9. A method of anchoring a fastener insert in a hole in a sandwich panel extending through one skin thereof and ending at the other panel skin, said insert having an internally threaded bore, a head at one end of the body and having a first flange, the other end of said body having a second flange providing a blind bottom for said bore, the method comprising providing the first or second flange with a pad of heat-softenable material, inserting said insert into said hole with the first and second flanges abutting said one and other skin respectively and with said pad in contact with said one or other skin, inserting a heated tool into said bore and heat-softening said pad by conduction of heat through the corresponding flange so as to bond the insert to the panel.
10. A method according to claim 9, wherein both of said flanges carry a pad of heat-softenable material, one of said pads being caused to yield under compression when softened in order to effect advancement of the other pad into contact with its respective skin.
11. An insert for anchorage in a sandwich panel, the insert being constructed and arranged substantially as herein particularly described with reference to Figures 1 to 5, or as modified by Figure 6, of the accompanying drawings.
12. A method of anchoring a fastener insert in a hole in a sandwich panel, the method being substantially as herein particularly described with reference to Figures 1 to 5, or as modified by Figure 6, of the accompanying drawings.

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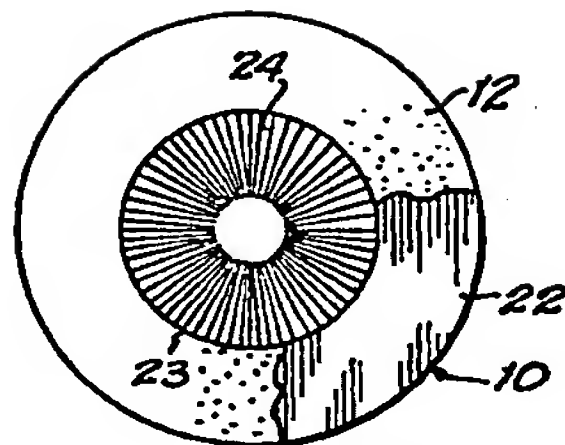


FIG. 1

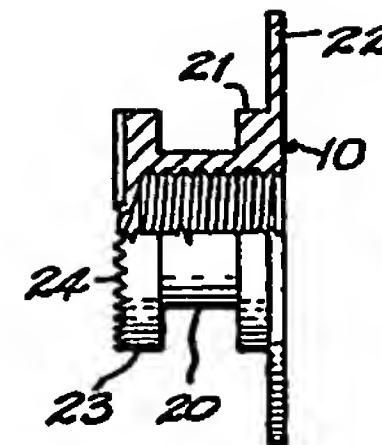


FIG. 2

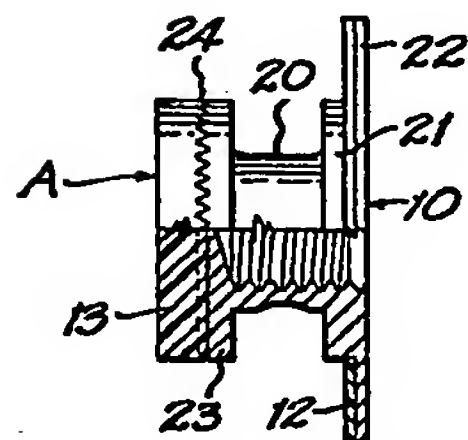


FIG. 3

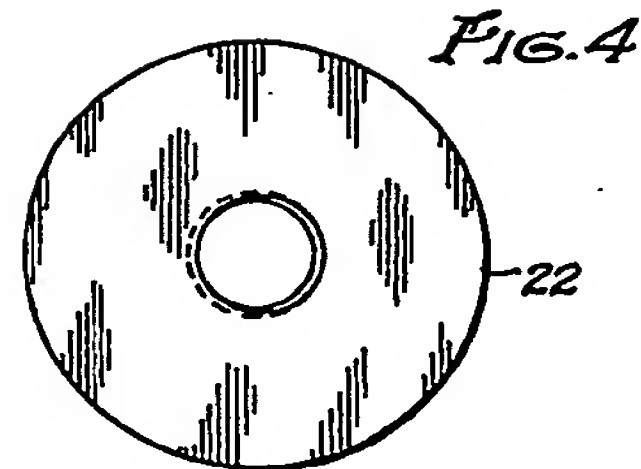


FIG. 4

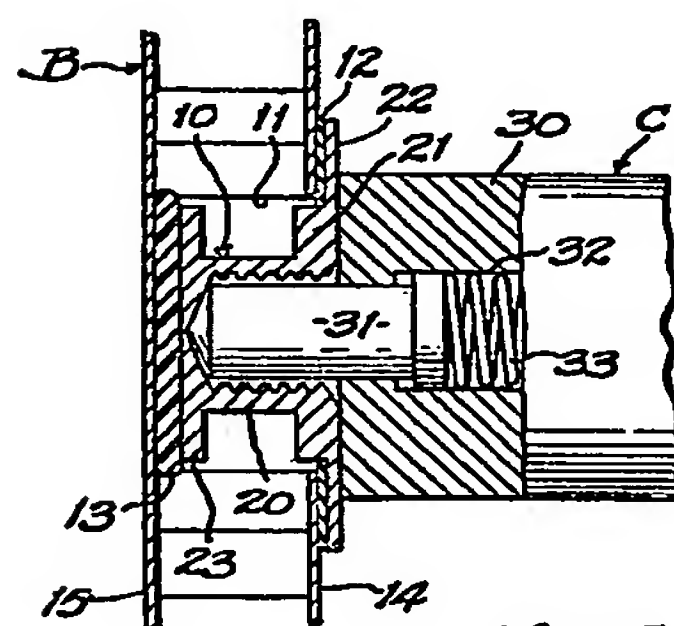


FIG. 5

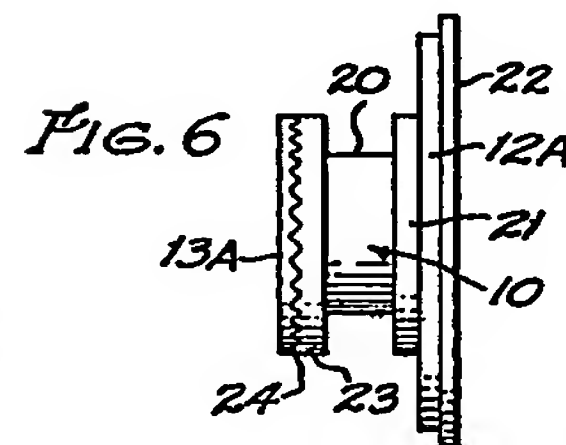


FIG. 6